

Transcript  
Let it Blow: Wind Erosion in the Desert  
Asombro Institute for Science Education

Hi everybody, it's Mr. Ryan from the Asombro Institute for Science Education. Today, I will be walking you through an investigation modeling changes to plant cover in the Chihuahuan Desert, and how that affects the amount of dust created by wind erosion.

Erosion is something that happens naturally when rocks or soil are worn away and then moved from one place to another by ice, water, or wind.

You probably have a lot of experience with wind erosion without even realizing it.

You probably have looked out your window and seen mountains one minute, only for them to appear hazy the next,

Or seen a dust devil moving through big open areas,

Or have been driving down the road when everything around you turned brown.

All of the brown in the air from these examples is dust, or pieces of soil, getting picked up and moved by wind erosion.

Scientists all over the world study wind erosion. One of these scientists is here with us today. Dr. Brandon Edwards of New Mexico State University. He studies the effects of vegetation (or plants) on wind erosion in deserts. His work helps people who manage land make good decisions about how changes in land use and climate change may affect wind erosion in the future.

We asked Dr. Edwards to explain some of the tools he uses for his work.

Researchers in the wind erosion community use a number of tools to help us figure out how vegetation conditions impact wind erosion.

One of the foremost one is a dust collector. These work pretty simply. As the wind approaches, it has dust in it, [air] goes into the tube and the wind slows down. The air inside the tube deposits the dust and exits the other side. They are actually quite efficient at trapping sediment and dust blowing in the wind.

Along with that, [knowing] the amount of dust blowing, one of the most commonly used instruments in the field is an anemometer which is an instrument that measures wind. This is a very simple device called a cup anemometer. It counts how many times the cup spins around. [We] can relate that to wind speed. That way we're able to work out things like if we have

much more dust blowing in one location than another but the wind is the same, what are the vegetation conditions that lead to that phenomenon.

Thank you, Dr. Edwards.

This is another very common type of dust collector. Wind carrying dust enters here and then dust falls to the bottom of the collector. You will be using a model dust collector like this one to do an experiment later in this lesson.

Now you might wonder: why do scientists care about the amount of dust created by wind erosion?

Well, soil loss from wind erosion can reduce the number of nutrients in the soil, making it more difficult for plants to grow.

Dust storms can be dangerous to humans, especially when over highways, it makes it difficult for drivers to see.

Dust in the air causes breathing problems, especially for those with heart or lung diseases.

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Why are scientists so interested in dust created by wind erosion?

- Loss of soil nutrients affects plant health.
- Dust storms can be dangerous to humans.
- Dust in the air causes breathing problems for people.

Now, let's pause here to test your understanding of wind erosion.

What is wind erosion? (Students answer this question in Edpuzzle)

What we can take away from all we learned so far is that wind causes erosion in the Chihuahuan Desert. What if the landscape changes, how does that affect erosion?

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We learned that wind can cause erosion of landforms.

Plant cover in the Chihuahuan Desert has been changing over the last couple hundred years. 200 and more years ago, much of the desert in southern New Mexico was a grassland desert. Spanish explorers wrote that the grass was high enough to "tickle the belly" of their horses. Today, this same area is mostly covered in shrubs like honey mesquite and creosote bush.

Some of this change in plant cover was caused by multiple years of extreme drought.

A drought is a period of time when an area receives less than normal amount of rain.

Another cause for this plant cover change was settlers moving into the area and trying to raise cattle on the grass. The double whammy of too many cattle grazing the grass and droughts not providing enough rain for the grass to regrow allowed for more shrubs to grow.

Further changes to plant cover have been made by humans. As more humans have moved to the desert, desert plants have been cleared from areas to build things like roads, houses, and buildings.

In our experiment today, we will be modeling these changes in plant cover in the Chihuahuan Desert and learn how that affects the amount of dust created from wind erosion.

What do you think will happen as the landscape changes from a grassland to a shrubland, or when plants are cleared in areas to create roads and buildings for humans?

You can find all of the supplies you will need today in your Asombro Science kit.

Let's look at what's inside.

Inside of your kit you have pipe cleaners. We will use these to model the plant cover.

[You will also find] a straw. You will blow through this to model the wind.

This snazzy pink box is representing your dust collector.

And all of these little paper pieces are modeling dust.

You will also need a piece of paper and a pencil.

You will measure erosion today by how many of these paper pieces (dust) are collected in your dust collector.

In a moment, the video will pause for you to go grab your Asombro science kit, then select the answer "I am ready!" to continue on to the experiment.

When you have all of your supplies, select the answer "I am ready!" (Student answer this question on Edpuzzle)

Let's set up our experiment! Follow along with me as I do each step.

Step 1. Evenly spread out the paper pieces representing dust in the bottom of the plastic container.

Step 2. Place your dust collector at one end of the plastic container with the box resting on the dust and the popsicle stick up.

Step 3. Our first trial will represent the grassland desert that once dominated this area. To model grass cover, take your pipe cleaners and fold them into a zig-zag pattern and place them in the plastic container on top of the dust.

For the next few steps, just watch what I do. I'll let you know when it's time for you to conduct this trial.

Step 4. [Take] the straw and place it on the edge of the container opposite the dust collector. Then set your lid on top. The lid does not need to be snapped on, just resting on top. That way it holds the dust collector and the straw in place and keeps most of the dust inside the container.

You will use your breathe to model the wind. Now, you want to make sure you blow the same way for each of the three trials today to make sure you are conducting a fair test. We are not testing different wind speeds today, just different types of plant cover.

Step 5. Blow into your container for a count of five. Make sure your straw is angled down, not up, when you do this.

Step 6. Carefully remove the dust collector from the plastic container. Wipe any dust off of the top because we only want to measure the dust collected inside of our dust collector.

Step 7. Pour out the dust from inside the dust collector and count how many were collected to answer the question that appears when the video pauses. Write down this number so you can compare it with the numbers you get in the next trials.

Step 8. Put the dust back into the container so we are always starting each trial with the same amount of dust.

Now it's your turn!

My dust collector collected \_\_\_\_\_ dust pieces in the grassland desert trial. Count the dust pieces and type the number in the provided space. (Students answer question in Edpuzzle)

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Step 1: Evenly spread out dust

Step 2: Place dust collector at end of container

Step 3: Grassland = zig-zag pipe cleaners

Step 4: Straw on the edge and place lid on top

Step 5: Blow!

Step 6: Carefully remove dust collector from the container

Step 7: Count the pieces in your dust collector

Step 8: Put the dust back in the container

Great job with that first trial everybody! For our second trial we will be modeling a shrubland desert. To model shrubs, take your pipe cleaners and fold them into a ball-like shape. Do you think this will create more, less, or the same amount of dust as our grassland trial?

You will do the same steps that you did for the grassland desert trial for the shrubland desert trial.

Here's a refresher on what you'll do.

Step 1: Evenly spread out the dust

2: Place the dust collector at one end of your container

3: Place your pipe cleaners representing shrubs into the container

4: Set the straw on the edge of the container

5: Blow the same way you did in the grassland trial to the count of five

6: Carefully remove the dust collector from the plastic container and wipe any dust off the top of the collector

7: Pour out the dust from inside the dust collector and count how many were collected to answer the question that appears when the video pauses. Write this number down so you can compare it with the results of the other trials

8: Put the dust back into your container

Now it's your turn!

My dust collector collected \_\_\_\_\_ dust pieces in the shrubland desert trial. Count the dust pieces and type the number in the provided space. (Students answer this question in Edpuzzle)

Was this more, less, or the same amount of dust collected than in the grassland trial? Type your answer in the provided space. (Students answer this question in Edpuzzle)

Another great job scientists! Now for our third trial.

This time we will be modeling land cleared of all plant cover such as a construction site. To do this, take your pipe cleaners out and set them off to the side. You will not put them in your container this time.

How do you think this will affect the amount of dust created from wind erosion?

Repeat the same steps as you did for the grassland and shrubland trials.

1. Evenly spread out the dust.

2. Place the dust collector in your container.

3. Do not put in the pipe cleaners.

4. Place the straw on the edge of your container and the lid on top.

5. Blow for a count of five with the same strength you used in the first two trials.
6. Remove the dust collector and wipe off any dust.
7. Count the number of dust pieces your dust collector collected. Write this number down so you can compare it to the other trials.
8. Put your dust back into the container.

You will use this experiment set-up for one more thing after this, and it's important that we continue to have a fair test.

Now it's your turn!

My dust collector collected \_\_\_\_\_ dust pieces in the human-cleared ground trial. Count the dust pieces and type the number in the provided space. (Students answer this questions in Edpuzzle)

Which trial collected the most dust? The grassland, shrubland, or human-cleared trial? Type your answer in the space provided. (Students answer this questions in Edpuzzle)

Great work today scientists. Now let's go check in with Dr. H. She will explain your next assignment for today.

Hi everybody! It's Dr. H from the Asombro Institute for Science Education. Now you've already recorded your results for how different types of plant cover affect the amount of dust created by wind erosion in your experiments with Mr. Ryan.

Now it's your turn. You're going to design a solution to reduce the amount of dust created by wind erosion in a human-cleared area, very similar to the third trial you completed earlier.

How would you reduce wind erosion in an area like this?

Your job is to use the same model as in your previous experiment trials, but this time you will design a method to reduce the amount of dust created from wind erosion.

You modeled the effect of plant cover on wind erosion, but what are some other ways to reduce wind erosion?

Farmers try to limit wind erosion by using living windbreaks. Trees, or shrubs are planted to stop or slow the movement of wind across the field, which helps reduce soil erosion.

There are also non-living windbreaks. Here's an example of a non-living windbreak that you will find in and around New Mexico, maybe in your neighborhood or even in your own backyard. Rock walls provide good protection from wind erosion by slowing the movement of the wind.

Without a windbreak, wind blowing across a field can lead to soil loss as wind picks up and carries the soil away. This makes it harder to grow plants.

Another technique for limiting wind erosion is to cover the soil with a material that protects it from the wind but still allows water to move into the soil so plants can grow. Archeological evidence at ancient pueblo sites in Galisteo Basin, NM shows that pebbles, rocks, and stones were used to cover the bare ground around crop plants in order to reduce soil loss from wind erosion. This technique is called Lithic Mulch Gardening.

Covering the ground as a way to reduce wind erosion is also used today. You'll see examples of materials like plastic mesh or straw around construction sites.

Alright! Now it's your turn to design and test a solution for reducing dust created by wind erosion.

You can use the original pipe cleaners that came with your Asombro kit or go outside in your backyard or your neighborhood and look for things to use. Whatever you choose, it has to represent something in the real world.

Start with the same set up as before using the straw to blow across the dust towards the dust collector with your engineering design feature in place.

Remember – use the same blowing technique as in the previous trials to ensure a fair test. Compare your results to the human cleared ground trial. Your goal is to create less dust with your engineering design solution.

If you are unsuccessful, try using different material or try positioning the windbreak in a different way. Keep trying until you create less dust.

Share your successful design with your classmates on the Canvas Discussion board.

Give a brief description of your design telling your classmates what your idea models in the real world, how many fewer paper pieces were collected compared to the human-cleared ground trial, would your design be possible in the real world, and share a picture if you are able to.

If you would like to continue learning about erosion take a walk around your neighborhood with an adult and look for evidence of erosion. Tell them what you know about erosion and see if together you can find examples of wind or water erosion. There is an optional Canvas discussion set up for you where you can post photos or tell your classmates about what you found.

Here are some examples that Mr. Ryan and Dr. H. found in their neighborhoods.

Well, that's all for now. Good luck. Have fun! And we will see you next time.